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Tracing medicinal agencies: Antidepressants and life-effects

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ABSTRACT

This article is inspired by the social life of methods approach, joining a movement among social scientists engaging with 'big data' to contribute to methodological innovation and conceptual development in research and knowledge translation. It explores human-drug associations using a computational tool, Medicine Radar, meanwhile raising questions about the ways a digital device pushes us to rethink how drugs are known in the everyday. Medicine Radar is an apparatus for exploring human-drug associations by means of Suomi24 (Finland24) data, containing 19 million health-related online posts spanning a period of 16 years. Using defined markers, Medicine Radar sorts the medicine talk in health-related discussions, thereby assisting us to 'see' the actions of the drug and human responses to them. This kind of approach distances the drug from the illness experience, drawing attention to the private details of the human-drug relationship. The empirical analysis separates three areas of antidepressant use: articulations of reactions, stabilizing the life effects of drugs and coming to terms with antidepressants. Together, the online posts urge us to think of everyday experience where the effects of drugs – intended or unintended – are always lived. The side effects of antidepressants, including drowsiness, ravenous hunger, loss of sexual desire and emotional numbness, become *life effects*. As will be demonstrated, the move from conceptualizing such fallout as side effects to understanding them as life effects has political ramifications. The computation tool adds collective weight to antidepressant experiences and calls for politicizing their effects on life.

1. Introduction

A research focus on how methods translate empirical data and promote some forms of knowing and knowledge formation at the expense of others has become newly revitalized by a research stream focusing on 'the social life of methods' (Savage, 2013). This approach raises questions about the historical, cultural, social and political ramifications of methods and methodological development, recognizing that the expansion of digital data gathering and use, mediated by digital tools and devices, has made these questions particularly timely (Marres and Weltevrede, 2013; Ruppert et al., 2013). Ruppert et al. (2013, 25) argue that digital devices rework 'the very assumptions of social science methods' by participating in the processes of 'seeing' and 'knowing' the studied phenomenon.

This article is inspired by the social life of methods approach, joining a movement among social scientists engaging with 'big data' to contribute to methodological innovation and conceptual development in research and knowledge translation (Bates et al., 2016; Kitchin, 2014; Laaksonen et al., 2017; Rapp, 2016). The reported study explores human-drug associations using a computational tool, Medicine Radar, raising questions about the ways a digital device pushes us to rethink how drugs are known in the everyday. Medicine Radar is a purpose-built apparatus (Ruppert et al., 2013, 30) for exploring human-drug associations by means of Suomi24 (Finland24) data, containing 19 million health-related online posts that span a period of 16 years. As an apparatus that traces a drug through the millions of messages and renders its actions visible, Medicine Radar participates in the debate over how a digital tool allows us to access (or not) health-related discussions that are intimate and collectively shared. By condensing views to the lived experience of medication use, an unobtrusive digital tool can aid in overcoming some of the difficulties of studying ethically sensitive and temporally shifting aspects of everyday use of drugs and pharmaceuticals (Petersen et al., 2018). Using defined markers, Medicine Radar sorts 'medicine talk' in health-related discussions, thereby assisting us to 'see' the actions of the drug and human responses to those actions. This kind of approach distances the drug from the actual illness experience with the consequence that we are no longer dealing with illnesses or medication trajectories, but articulations of drug experiences.

Everyday drug use has been explored in the fields of sociology, anthropology, social psychology, the medical humanities and STS. Research highlights the overall expansion of pharmaceuticals in the

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everyday and practices connected with drug use (Abraham, 2010; Martin, 2007; Will and Weiner, 2015). Explorations of patients' and consumers' views on medications focus on the interpretative repertoires of drugs (Lumme-Sandt et al., 2000), and the willingness, reluctance and refusal to engage with suggested courses of medical treatment (Gibson et al., 2014; Pound et al., 2005). Within the clinical framework, patients are expected to follow the instructions for the use of medication, but in the everyday people tinker with drugs and may substitute other treatments (Will and Weiner, 2015; Weiner and Will, 2016): experimenting with medications and dosages and modifying and alternating their use of drugs in order to alleviate symptoms of illness or side effects of medication. While using drugs, the doctor is not the only ally; drug consumers rely on the advice and support of family, friends, colleagues and online peer and mentors (McCosker, 2018; Tucker and Goodings, 2017). The knowledges and practices regarding drug use and their effects can grow into a detailed 'folk pharmacology' (Southgate and Hopwood, 2001).

The exploration of medicine talk by means of a digital tool adds a focus to scholarly work that highlights the recurring features of human-drug encounters, exposing how nameless allies and peer mentors share information about the known side effects of drugs, and encourage and caution others in their medicinal encounters. As previous research has indicated, online forums might be preferred to face-to-face encounters when discussing sensitive and stigmatized health-related topics (Petersen et al., 2018; Tanis, 2008). While the ideal goal of drug use is straight-forward – to alleviate symptoms and illness – the anonymous posts in Suomi24 data address a broad range of issues concerning medication, both those leading up to the decision to take it and also after receiving the prescription. As agents of health and wellbeing, drugs are supposed to exercise mechanical and linear causality. When a painkiller eases a headache, or an allergy medicine eases the symptoms of hay fever, it means that our bodies are being worked on in exactly the right way. The more mechanical the causality drugs offer, the more competent they appear in their agency. Competent drugs are quickly adopted; they are precise and efficient, reinforcing modern notions of control and allowing us to govern the processes and entities of human lives. Yet not all drugs, or the same drugs universally, have such mechanical and straight-forward agency – think of warfarin, for instance (Dickson, 2018), with the known unintended and unwanted agencies of medicines being listed in the leaflets inside drug packages as side effects. Drugs might also have no effect on certain bodies, or their agency might diminish over time and be complicated by 'placebo effects' or factors such as alcohol, smoking, exercise, general health status, weight and age.

When delving into drug talk with the aid of Medicine Radar, antidepressants appeared to be exceptionally unpredictable in their agency. In Finland, as in many other countries, antidepressant use is fairly common (with approximately 7 percent of the population using them yearly). After reading some hundreds of posts focusing on an antidepressant sold in Finland under the label Mirtazapin (previously Remeron), it became obvious that, in the case of antidepressants, the causality that the Medicine Radar aids in exploring is 'emergent' (Connolly, 2004), rather than mechanic. Emergent causality refers to medicinal agencies that are not known in detail prior to effects that appear over time, suggesting 'a melting of cause and effect' (Bennett, 2010, 33), the impossibility of tracing a linear sequence of events in terms of causality. In order to not to limit the discussion to one drug, exploration was expanded to another antidepressant (Venlafaxin). Based on the posts, antidepressant engagements are characterized by processes of 'trial and error' (Schofield et al., 2011, 145) that can be relatively short-lived, or last weeks or months. Not only do antidepressants act differently on different bodies, they may operate at different intensities within the same body over time (Bennett, 2010, 41–24). Thus they collaborate with humans in ways that cannot be fully anticipated, giving rise to various kinds of effects that might intensify each other, or work in different directions (Wilson, 2008).

In the following, the goal is to explore emergent causality by means of online comments, and demonstrate ways in which humans respond to an unpredictable nonhuman agent. The decision to take prescription drugs can mean entering into collaboration with a medicinal agent whose effects and actions cannot be predicted or controlled. By attending to emergent causality, a tool like Medicine Radar can aid us in seeing how people live with and respond to the 'other' agencies of medications, discussed under the rubric of the placebo or side effects, or framed as failures of medical treatment. The purpose-built apparatus offers a window onto human-drug associations that are deemed worthy of sharing with others online. Comments on antidepressants – which might have been written when actively suffering from serious side effects – suggest that drugs can either enhance or weaken the power of the human will and human behavior. A focus on these instances is a tribute to the silent work of enduring the effects of antidepressants; the posts, traced with the aid of Medicine Radar, urge us to consider the everyday where the effects of drugs – whether intended or unintended – are always lived. The side effects of antidepressants, including drowsiness, ravenous hunger, itching, sores, loss of sexual desire and emotional numbness, become *life effects*. As will be argued, this move from regarding such outcomes as side effects to acknowledging them as life effects has political ramifications. Following Bennett (2010), the inconsistent nature of antidepressants calls for politicizing their effects on life.

1.1. Developing a radar

In spring 2017, together with a data scientist colleague, Krista Lagus, we approached the technology company, Futurice's Chilicorn Fund, a corporate social responsibility program, with a proposal to develop a research tool for exploring medication talk in the Suomi24 data. Originally a by-product of a generic discussion forum, the Suomi24 data – consisting of anonymous posts covering themes from politics and religion to health and travel (Lagus et al., 2016) – had grown on the company servers for over a decade, gaining new life and purpose when the company decided to open the proprietary data for research purposes. Health-related conversations include tens of topics, ranging from addiction and eating disorders to illnesses such as diabetes, depression, migraine or skin diseases. Less than 10 percent of the users of the Suomi24 forum are registered and most writers reveal little about their background. Consequently, we do not know the age or levels of education of people writing about their antidepressant experiences or whether they live in urban or rural environments. Even the well-known gendered aspects of depression remain unsubstantiated by the posts (Fullagar & O'Brien, 2012). Despite its massive volume of millions of comments, Suomi24 data are 'thin' on personal and collective contextual features, particularly when compared to qualitative research data generated by means of interviews and ethnographic accounts. The thinness of the data requires careful consideration of how to make the material thick enough to be of value for research.

The characteristics of the Suomi24 data have been discussed in more detail elsewhere (Lagus et al., 2016), emphasizing 'the brokenness' in terms of its gaps and absences (Pink et al., 2018). Despite these flaws and limitations, the dataset is unique in its size and openness, and tens of researchers have been, or are currently working with it (Lagus et al., 2018a; Pakkasvirta, 2018; Ylisiurua, 2017). A particular strength of big data is that they can be used for building digital devices that can participate in the processes of seeing and knowing digital traces in online conversations. From this perspective, the Suomi24 data enable the testing and probing of the social life of methods approach, querying how digital devices aid us in seeing the subject matter of research, thereby pushing us to rethink what is already known.

Futurice's team, Atte Juvonen and Chang Rajani, started the data work by identifying medicine and symptom concepts in the millions of online posts. The idea was to use medicine words as 'markers' for gaining traction on the data. The benefit of focusing on medicine words

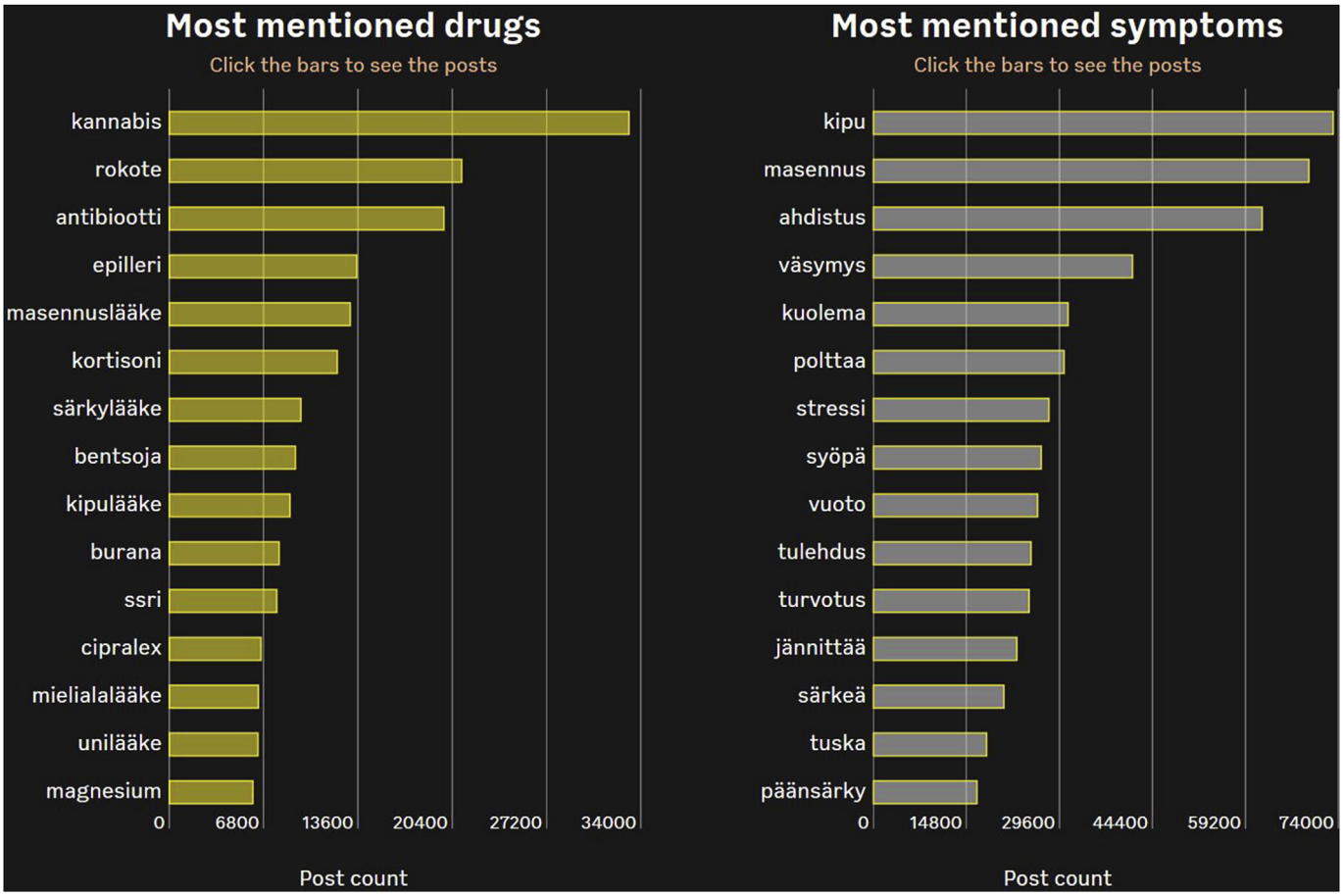

Fig. 1. Cannabis is the most mentioned drug and pain the most mentioned symptom in the Suomi24 data.

in Finland is that they are typically of foreign origin and not easily confused with other Finnish words. Concept-oriented analysis of the Suomi24 data had already been undertaken with emotion vocabularies by Krista Lagus, so our team had a good understanding of how to generate concept vocabularies with this particular dataset (Lagus et al., 2018a, 2018b). We were unable to locate symptom word lists to support the forming of concept vocabularies, but medicine word lists could be found online. They were insufficient, however, as the same medicine can have many marketing labels and medicines are given nicknames and abbreviations. All such variations needed to be included in the vocabulary to capture as much medicine talk as possible.

The forming of vocabularies was supported with a 'theme word' collector, developed by the data analyst team in Futurice, working through so-called 'seed words' (Lagus et al., 2018b) with Word2Vec (Mikolov et al., 2013) to aid in finding semantically and syntactically similar words. The Suomi24 discussions also cover substances such as cannabis and magnesium, so they were included in the drug vocabulary because, in the same way as medication, they are discussed online as remedies. In fact, cannabis is the most mentioned drug in the posts (Fig. 1). The vocabularies were finalized by adding common words that seemed to be missing from the list of key words, with some manual editing, and consist of approximately 1500 medicines and medicine-like concepts and 500 symptoms, with tens of thousands of surface forms.

During the formation of vocabularies the data analyst team discovered that drug talk often includes dosages and an additional dosage feature was added to the machine learning approach (Fig. 2). Overall, the vocabulary work was more prone to omissions and errors in the case of symptoms than medicines, suggesting that Medicine Radar works more accurately in tracing medications than symptoms. The theme word collector and the vocabularies used for developing Medicine Radar have been published as open source, and the web interface of Medicine Radar (https://laaketutka.fi/) is publicly open, and provides background information on how medicines and symptoms are correlated. The interface allows anyone to conduct a search with a medicine keyword and thereby also participate in the discussion concerning the findings of this study.

Medicine Radar's interface visualizes patterns, particularly with the dosage feature, in the way drugs are discussed online. This quality was highlighted when the device was named 'a radar', a system for detecting the presence, direction and distance of medication vocabulary in relation to dosages. With its computation powers, Medicine Radar efficiently demonstrates the volume of posts discussing antidepressants (13,052) or SSRIs (7756). In order to have enough posts mentioning a specific drug (in this study Mirtazapin/Remeron and Venlafaxin), the dataset needs to be large, emphasizing the uniqueness of the 19 million-post dataset on which we have worked. With this kind of proficiency, the digital tool participates in 'seeing' in a way a human cannot, competently spotting only those messages that mention a group of drugs, or a particular drug. When the radar breaks the logic of conversation and positions the drug at the centre as a powerful agent around which everyday accounts are crafted, it participates in giving a researcher a perspective from which to see. Medicine Radar pre-formats the data for research, but also proposes an analytical emphasis. This means that the digital device not only participates in seeing and knowing the research data, but also advocates a research focus on the subject matter at hand.

1.2. *Emergent causalities*

In terms of the social life of methods approach, digital devices can

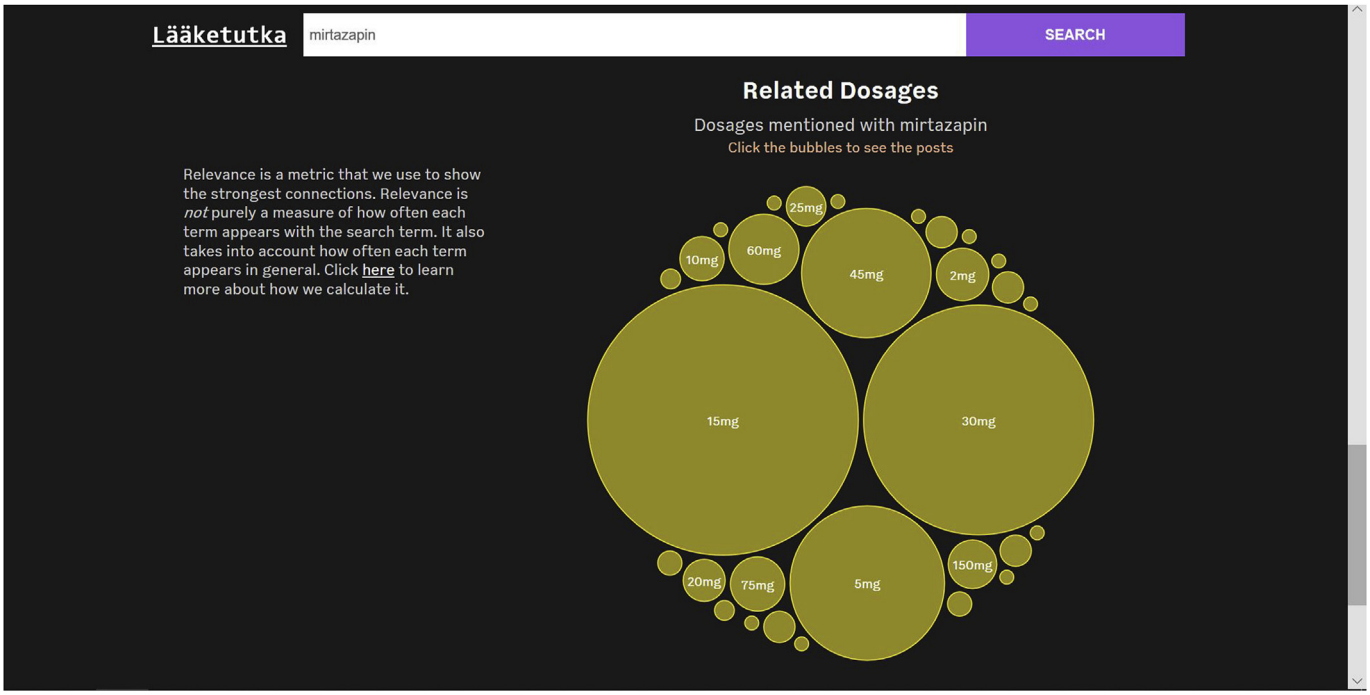

Fig. 2. Medicine Radar sorts the posts according to the drug dosages mentioned.

be regarded as materially implicated in the production and performance of certain associations in the studied phenomenon at the expense of others (Ruppert et al., 2013). As suggested above, Medicine Radar advocates the study of emergent causality in terms of antidepressants effects. Meta-analyses of the discoveries from randomized controlled trials (RCT) have questioned the efficacy of antidepressants (explicitly SSRIs) (Kirsch and Sapirstein, 1998; Kirsch et al., 2002), drawing attention to their non-pharmacological and non-linear causalities (Walsh et al., 2002; Wilson, 2008). The ingested antidepressant pill never works in isolation, and therefore has no discrete agency all to itself (Trivelli, 2014). The drug activates in the context of the body-mind, through molecular-level relations that the drug forms with the drug consumer; furthermore, it can have effects even before it has been ingested (Wilson, 2008). This complex relationality explains how a single drug can have such different effects. The online comments, for instance, describe the same drug, Mirtazapine, as both a savior and a personal hell, accentuating the ambivalent nature of the body-mind encounter: both attraction and repulsion characterize antidepressant drug use (Martin, 2007, 171).

How antidepressants are put to work, and how the underlying physiological processes triggered by drugs are understood, depend on their historical and organizational contexts (Mulinari, 2012). Sandell (2016, 133) points to a curious paradox: whereas most pharmaceutical companies no longer develop psychoactive drugs such as SSRIs because the hypothesis of biological mechanisms underlining the efficacy of such drugs is not solid enough to justify further development, in primary health clinics, SSRIs are still the treatment of choice for depression – or what is believed to be depression. Diagnosis of depression – the most common condition to result in being prescribed antidepressants – is historically contingent and based on descriptive symptoms with no clear etiology (Ehrenberg, 2016; Jauho and Helén, 2018). Overall, the linkages between diagnosis, treatment and outcome remain unstable, even if stabilizing such linkages is fundamental to systems of drug design and approval (Dumit, 2012).

The research evidence that details major uncertainties in how depression is diagnosed and antidepressants are developed, tested and prescribed suggests that poor efficacy and related emergent causalities are established features of antidepressants, rather than anomalies. It is thus no coincidence that it is the unstable and ambivalent aspects of antidepressant encounters that Medicine Radar quickly discovers. For the purposes of this study, antidepressant 'actions' are defined in a very specific way: the goal is to focus on emergent causalities by exploring how antidepressant experience is shared and discussed online. When investigating medication talk in the health-related posts of Suomi24, the focus remains on the drug. Users of online health forums offer accounts of sequences of events, treatment outcomes and failures; their depression might be diagnosed as mild, moderate, or major; it could be defined as bipolar or postnatal. Moreover, the comments describe antidepressants as treatment for anxiety, panic attacks and insomnia. Tracing drug encounters with the Medicine Radar means that even if the human experience is foregrounded and emphasized in the online posts alongside medicinal agencies, the vista that the radar offers is biased in favor of the medicinal agent. Thus the medicinal agency that is discussed online is not 'the actual' agency of the antidepressant, but a personal articulation of a human-drug encounter that foregrounds the drug as an agent. When the posts address antidepressant action, they tend to portray it as action that is caused by an 'external agent' that operates all by itself. The antidepressant agency is isolated and purified, as if the antidepressant remains separate from the body-mind where the pill lands when ingested.

Not knowing what the medicinal agent will do to *my* body-mind lies at the core of the online antidepressant experience that Medicine Radar exposes. Despite this kind of framing, however, the goal is not to suggest that an antidepressant is an entity capable of working alone; rather, this is how the drug is perceived in action. Online posts speak about the antidepressant from a position in the long-standing Western tradition of subject-object division, where events and transformations are understood as being caused by external forces. As Taylor (1989) suggests, our perceptions of autonomy and dependency are defined by the notion of free will, according to which an independent agent autonomously sets goals for action. The actions of a dependent agent, on the other hand, are influenced by an external force disconnected from the individual. In the case of antidepressants' becoming such external forces, it is as if they work irrespective of the humans involved. Consequently, online discussions say less about how the human co-evolves with the antidepressant than human adjustments to and expectations of the 'pill-

power' (Trivelli, 2014, 158), understood as the potential of the pill to influence the pill recipient. The medication is seen to open a 'window of opportunity' that can restore 'the functioning self' (Sandell, 2016, 136) and 'normality' (Fullagar, 2009, 397). The depressed is ready to surrender to the medicinal agency with the anticipation that the drug will provide improvement. The posts share the disappointment felt when the 'pill cure' does not work, something reflected in the frustrated and negative tone of many comments. The positive aspects of antidepressants are, however, also apparent in discussions. Ultimately, the comments describe how human users try to stabilize medicinal effects, as if the pill were an entity that needs to be tamed and domesticated. This has consequences for shared antidepressant imaginaries. As discussed further below, the online comments propose that people respond to effects of the pill by observing them and adjusting to them, while accepting that unexpected things may happen along the way.

1.2.1. Ethical questions

During our project, we evaluated the ethics of offering our research tool as an open web interface: we were aware of the questions and controversies surrounding uses of personal data and committed to following the ethical principle outlined by the Association of Internet Researchers to the effect that people retain expectations of privacy when online, which should be respected (http://aoir.org/ethics/). The GDPR (General Data Protection Regulation) allows scientific use of anonymous online data, and we discussed with Aller, the owner of the Suomi24 data, how to protect their users when working with Medicine Radar. All the Suomi24 posts have been published online prior to our project and they are publicly accessible through search engines, mainly Google, with no sign-in process. We have not increased the visibility of the posts, other than by allowing them to be searched in a new way.

The open web interface is designed for key word searches that break the logic of discussion threads, so it actually makes it more laborious to track and identify individual writers. Medicine Radar allows the checking of the original context of the post in the discussion thread, but the writers remain unidentified. We could, of course, classify or segment users by carefully analyzing their comments, but this has not been our aim. In the analysis, we concentrate on the thematic and topical organization of the posts by exploring how antidepressant experiences are shared and discussed online. To emphasize the topical orientation, with the exception of some expressions, we do not cite the online comments verbatim. The quotes offered as examples are generic and combined from more than one post. They represent anonymously produced text that provides patterned insights into the collective antidepressant landscape and how antidepressant experiences are shared with others facing similar problems and outcomes. As they describe human-drug associations, they raise more general questions about what it means to live alongside powerful medicinal agencies and what kinds of life effects they might have.

2. Research design

2.1. One antidepressant at a time

A key word search with Medicine Radar produces a view of online posts displayed one above the other on consecutive pages on the screen. After an initial reading of the antidepressant posts, the empirical study focused on three sets of posts discussing antidepressants – Mirtazapin/Remeron and Venlafaxin. These three were chosen because of the fairly high volume of posts (Mirtazapin 3039 posts, Remeron 1,386, Venlafaxin 2242) and the commonplace nature of the drugs in the treatment of anxiety and depression. Online remarks that mention Mirtazapine produce 155 pages of material. Some posts are long and detailed, but the majority of them are short and fairly uninformative. With enough posts the limited information of posts starts to accumulate into a more coherent and patterned vista of human-drug associations.

The decision to trace posts referencing individual drugs, rather than more general antidepressant or SSRI posts, was crucial in terms of the research design. By focusing on one drug at a time, we are not confronted with more general talk linking antidepressants to gendered and societal demands to succeed in life (Fullagar, 2009; Fullagar & O'Brien, 2012) or to institutional forces that define how drugs are developed, designed and distributed (Martin, 2007; Dumit, 2012). Such broader views are important in terms of antidepressant experience, but they tend to drift away from personally felt human-drug associations (Trivelli, 2014). When a drug is named in the post, writers typically have a relationship with that specific drug either as users or potential users. The intimacy of this relationship resonates with Elena Trivelli's portrayal of the process of taking an antidepressant:

> This simple ritual of drawer opening, foil clicking, resilient and resigned swallowing, makes a little colourful object slide down into my stomach, ready to swim, melt, affect me, change me. *Make me.* (Trivelli, 2014, 159, emphasis in original)

Posts that name a certain antidepressant are written in the first person, either asking for advice, describing personal drug experiences or offering others advice and encouragement. They have an atmosphere of peer support, sharing suggestions and warnings to avoid the rocky part of trials with antidepressants. Thus, in terms of Suomi24 data, tracing human-drug associations one drug at a time, rather than in relation to groups of drugs (antidepressants, antibiotics, statins), appears to uncover more intimate and less certain aspects of antidepressant encounters, following experiences closer to the bodies, and recognizing the efficiencies and inefficiencies of medicinal agencies. As argued below, this draws attention to the recurring nature of private details of the human-drug relationship, suggesting a focus on repeated reactions to antidepressant effects.

2.2. Articulating reactions to life effects

Seeking a patterned vista to antidepressant encounters, two research assistants first sorted Mirtazapine/Remeron and Venlafaxin posts according to three phases: starting the medication, struggles with the antidepressant and discoveries concerning the human-drug balance. Narrative framings have arranged earlier studies, underlining how the act of taking medication activates a sequence of events that at some point finds its resolution, either in parting ways with the antidepressant, or integrating the medicinal regimen into the everyday for years to come, either permanently or periodically (Gibson et al., 2014; Sandell, 2016; Trivelli, 2014). The hardships of the first days of the regimen confirm that the drug can cause major disturbance to the body-mind, suggesting an empirical focus on stabilizing the human-drug relationship (McLeod, 2014; Weiner and Will, 2016). Following more closely the stabilization of human-drug encounters in the online comments, discussed in greater detail below, gives rise to the proposal that antidepressant engagements are not linear and straightforward, but rather messy. Antidepressant effects are physiological, but also influenced by factors discussed under the rubric of themes such as 'non-pharmacodynamic milieu' (see, Wilson, 2008, 38). Human-antidepressant associations remain both varied and difficult to isolate (Wilson, 2008). Antidepressants are taken one at a time, but also simultaneously, then stopped because of felt side effects, stopped and changed to another antidepressant, stopped and restarted with a smaller or bigger dose, or stopped and replaced by alcohol or illicit drugs. With this kind of multiplicity, we needed to modify our approach. We kept the three part structure of exploration, but modified it so as not to arrange the posts according to three phases of a sequence, but as three responses to the irregular and disruptive agencies of antidepressants.

In its second iteration, the empirical work focused on the exploration of the topical organization of the posts by reading them through and tracing ways in which efficiencies and inefficiencies of antidepressants were discussed and dealt with. We explored more closely

the stabilization of the human-drug relationship, which proved to be a prominent feature of the online conversations.

Along with this, posts describe recurring trials and errors and the disappointment of not finding a medicinal repair, explaining why posts gravitate towards the negative effects of antidepressants. As in interviews, the posts discuss the qualities of medicinal agencies that restore the ability to function in the everyday (Sandell, 2016), but they also describe the worst aspects of antidepressant associations. In the case of Mirtazapin, nicknamed 'the fattening pill' in the posts, the leaflet inside the package lists increased appetite, weight gain, drowsiness and dizziness as side effects. Those of Venlafaxin include anxiety, shaking, sleep problems and increased sweating. Similarly, posts describe insatiable appetite, tiredness, agitation and emotional numbness. The sweating caused by Venlafaxin can become so intense that bedlinen must be changed in the middle of the night.

The focus on emerging causalities of antidepressants and their unruly and non-linear nature pushed us towards exploration of the life effects of antidepressants. The term 'side effect' suggests the possibility of circumventing or sidelining the undesired effects of a drug, but many comments forcefully challenge this idea, suggesting that side effects need to be explored as life effects. Being attentive to 'life effects' while reading the posts meant that we concentrated on finding the topical and thematic commonalities in how antidepressants shape and shatter life and how people respond to that. This led to the final framing of the empirical analysis, focusing on how antidepressant effects are either stabilized or seen to operate as external forces that possess powers that the human can only observe. As external forces, antidepressants are seen to have life effects that cannot be withstood. The nonhuman agent, the pill, is in charge, while the human merely observes and waits for the human-drug relationship to balance and improve with time. The failures of such balancing explain why dosages are altered and medication use is terminated. The ultimate powers of antidepressants become vividly evident in posts that describe how people are trying to part ways with the drug, or how they come to terms with the life effects of antidepressants and eventually see them as an inescapable part of existence.

3. Findings

3.1. Stabilizing antidepressant effects

The posts that discuss the selected antidepressants do not question the received prescriptions, but they do question the antidepressant effects with which the users will soon be confronted*: Is it true that I will gain weight? Will I become sleepy and torpid? Will I be able to work?* The repeated questions in the online comments stress that antidepressants are known to be irregular and unruly agents, producing effects that cannot be fully anticipated. Posts ask advice on how to prepare for the unknown, while the more experienced writers share tips to confront the emerging causalities of the drugs. At first, they explain, Mirtazapin causes daytime sleepiness and makes one torpid. And yes, it increases the appetite, but when you acknowledge that and keep your eating rigorously under control, the weight does not increase by more than a couple of kilograms.

As is typical for online forums, posts offered for peer support are written as advice: 'At first you might feel rotten, but after taking the antidepressant for a couple of weeks, or some months, you will notice what a good drug it is.' The peer advice focuses on relieving the pain of others, translating into practical assistance and encouragement to ease human-drug collaboration: 'Once the drug start to function properly, your mood will improve and everyday powers will be recovered.' The advice given underlines how the effects of the medicinal agent can be controlled, stabilized and domesticated with patience and will power. The role of the human agent is underscored: 'Don't get nervous if you feel very torpid after two-three days of starting, it will pass!' The shared conviction here is that the initial side effects are worth enduring.

The work of stabilizing the human-drug relationship has not gone unnoticed in earlier research (McLeod, 2014; Weiner and Will, 2016). On a concrete level, it involves developing a daily routine of pill taking. The pills need to be kept in an easily accessible place in the handbag, on the bathroom shelf or in the bedside drawer (McLeod, 2014). The advice given online normalizes the idea that it takes time before medicinal agencies are properly tamed. The human needs to be prepared for this, and to learn ways to adjust to the pill-power. Given that starting the medication can have effects that disturb everyday work routines, it might be a good idea to practice with the medication on a day off, or over the weekend. The posts even share tips on how to halve the tablets: with dry hands and a sharp knife, otherwise the tablet will melt. If you take the medicine too late in the evening, the posts point out, it is hard to get up the next morning and the whole day goes by in a bit of a fog.

The online comments are concrete reminders of how personal the effects of drugs are. Furthermore, it seems not uncommon for antidepressants not to be taken in the prescribed manner. Practices of stabilizing everyday life with medicinal agencies involve lowering the dose, taking them less frequently or taking 'drug holidays' (Pound et al., 2005, 152). In the case of preventive medication like statins, people move between use and non-use with relative ease (Weiner and Will, 2016). With antidepressants, however, the transitioning between use and non-use can trigger unpleasant, even agonizing withdrawal symptoms, with the result that medicinal agencies are not tinkered with as effortlessly. Still, in light of the antidepressant posts, people appear to be exercising agency over medicinal agencies by regulating the dosages taken and experimenting with them. Mirtazapin posts discuss lowering the dosage when better sleep is the goal, but increasing it to combat depression: in terms of sleep the best dosage is said to be less than 15 mg, it could even be as low as 2 mg. Indeed, antidepressants are consumed as 'crumbs' when the aim is to secure sleep. The posts also reiterate the importance of the body size of the individual taking the drug: for a petite young woman, a 15 mg dosage can be enough, while large men can take 45 mg. Thus it is no coincidence that the online posts are detailed when it comes to dosages, underlining that the agency of the drug can be controlled, if the dosage is right, for the individual and for the condition.

3.2. Observing life effects

While stabilizing the human-drug relationship refers to active responses to antidepressant effects, another kind of patterned response to the emergent causalities of antidepressants portrays the human at the mercy of the antidepressant; it is the drug rather than the human that possesses the power to set the goals for action. When writing the prescription, the doctor might have mentioned the possibility of increased appetite, a known side effect of the drug, but the drug user is still ill-prepared for what lies ahead. Comments describe how the effects of drugs shape the everyday: relentless appetite and the impossibility of sleeping due to thoughts about the contents of the larder and what to eat are common symptoms. At night, people find themselves standing in front of the refrigerator, wolfing down whatever they find. Posts appear exaggerated, mentioning a 10 kg weight gain in under two months, despite a strict exercise regimen. The newly gained kilograms 'settle on the thighs' and the stomach, producing 'a puffy ruin', as one Mirtazapin user claims.

Antidepressant agencies capture and shape the bodies and minds, the posts appear to be saying. The kilograms gained are framed as warning signs. 'Do not touch Mirtazapin, even if it is recommended (weight gain 12 kg).' The new body shape is described with resentment: the stomach hangs over the pants and clothes no longer fit. Rather than factual descriptions of human-drug encounters, the comments seem like personal articulations of lost autonomy. They portray the antidepressant as an external force disconnected from the individual, offering personal records of how the 'medication works on the body', as Sandell puts it (2016, 138). Reading individual accounts of depression closely, Sandell (2016) suggests that biology has become a destiny for

the depressed, who no longer try to make sense of their depression but, rather, treat it as a condition that is unexplainable and empty of meaning. Similarly, antidepressants possess powers that cannot be shaped or fought: the medicine triggers effects that one can merely observe.

The medicinal agent – rather than the body – appears as a flexible and malleable force in drug-related comments, producing variations in moods and bodily functioning depending on the body-mind on which it is exercising its agency. Since they emphasize the problematic aspects of human-drug encounters, the posts detail dramatic variations rather than a causal linearity of good antidepressant action. For instance, problematic encounters with Remeron, 'rat poison' as one of the posts calls it, include feelings of being paralyzed, with legs that no longer function, a sense of being drunk and therefore afraid to drive, a sensation of electric shocks in the head and not being able to keep still while trying to go to sleep. The drug is also said to cause people to become so muddled that, waking in the night, they enter the closet instead of going to the bathroom. Earlier studies argue that antidepressants challenge the sense of self by generating 'a mental anesthetic' (Schofield et al., 2011, 145) and making people feel emotionally numb (Sandell and Bornäs, 2017). Similarly, one of the posts vividly describes 'a chemical lobotomy'. By detailing responses to medicinal agencies, online comments offer experiential weight to how emotionally and physically challenged one might feel with antidepressants. The online forum is a place of co-journeying, where people can anonymously voice their concerns and discuss how unbearable and maddening the life effects of antidepressants are. On the other hand, however, posts also talk about drugs having no effect. People wait to observe life effects, but can detect no change other than being extremely tired. The antidepressant experience remains a 'puzzle of mind-body affiliation' (Wilson, 2008, 39).

3.3. Coming to terms with life effects

The third identified response to human-antidepressant associations portrays the drug as an ally rather than an enemy. This involves coming to terms with the life effects of antidepressants. Before getting there, however, antidepressants might be abandoned either in the short term, or for good. Comments that discuss setting limits to pill-power by terminating antidepressant use make it clear that becoming reconciled with the life effects of antidepressants might not be possible. Emergent causalities of antidepressants, becoming emotionally numb or losing sexual desire, are typical reasons for ending medication (Schofield et al., 2011). The posts that advise on how to part ways with the antidepressant convey a human-drug symbiosis in which the body has adjusted to the drug; if the two are separated, the chemistry of the body gets messed up. Experiences of antidepressant withdrawal are narrated as the human battling against pill-power. Comments underline how the withdrawal needs to be conducted with care, by cautiously lowering the dose and with careful monitoring. Yet, even if people try to lower the dosage gradually, withdrawal symptoms may be unbearable: intense nausea is felt, electric shock waves go through the body, sleep becomes unattainable and anxiety and depression return immediately after the effects of the medicine dissipate.

The posts also speak of abrupt endings, of decisions to stop the medication, once and for all. This happens when the will to limit the pill-power is greater than the fear of the effects of giving up the drug. Descriptions of withdrawal symptoms end with appropriate warnings: 'Never start antidepressants, if you want to avoid this hell.' Successful withdrawals from drugs are celebrated with descriptions of looking more natural, thinking more clearly and feeling both positive and negative emotions. On the other hand, the posts point out that if life does not rebalance within a reasonable time after stopping the antidepressants, or if the anxiety, depression or insomnia return, one can always resume medication. Online comments can look like reviews, listing medications and their combinations, and comparing their strengths and weaknesses. A person's 'anti-depressant career' might mean being exposed to one pill after another, or simultaneously; meanwhile, some medications produce better combinations and results than others.

Ultimately, however, if such tinkering is unsuccessful, and the option of stopping the antidepressants has failed, sometimes the only course of action left is to stop trying to limit the pill-power, and accept human-drug associations as a permanent part of everyday life. In other words, one must come to terms with the life effects and learn to live with them. Even if it might be emotionally healthier to do without antidepressants, resulting in no longer feeling like 'a robot' or 'a machine' (Sandell and Bornäs, 2017), it might not be possible. As Sandell (2016, 139) argues, a person's depression may not be curable, merely managed, with antidepressants becoming life companions. If someone cannot function in the structures of daily life, 'capsules of potentialities' (Trivelli, 2014, 159) can be of assistance. The drug becomes framed as a handmaid that maintains the everyday operation of the self. The life effects of the drug, resulting in no longer being able to laugh naturally or leaving life a 'dull grey', are still a better option than not being able to get up in the morning and take care of everyday tasks. Coming to terms with antidepressants can mean that drugs are 'for life' (Dumit, 2012).

4. Discussion

4.1. Politicizing life effects

In making aspects of antidepressant experiences visible, Medicine Radar works as a researcher's ally in detecting the emergent causality of antidepressants. The manner in which the radar portrays recurring features of human-antidepressant associations breaks the logic of online peer talk and positions antidepressants at the centre of attention as powerful agents that oblige humans to respond to their effects. The radar is implicated in knowledge formation by directing empirical exploration in a way that disassembles personal articulations of antidepressant experiences into medicine-triggered responses. Consequently, the antidepressant experience can be divided into three responses to felt life effects of antidepressants – stabilizing them, merely observing them or coming to terms with them – that engage with previous qualitative studies from diverse perspectives.

The empirical analysis presented makes the selective manner in which the radar treats online conversations very evident: it promotes a drug-centric perspective, demonstrating how medicinal agencies operate on pill-power. On the other hand, reading the online comments and learning how writers articulate their antidepressant experiences balances the machinic view that the radar offers. Comments reveal personal experiences with reflective powers that aid in describing and managing the vagaries of the human-drug relationship. By articulating antidepressant effects, personal hardships with medication are transformed into a more conscious human-drug relationship and connection with others (Schofield et al., 2011, 145). Online, experience gained through trial and error with antidepressants offers the possibility of establishing 'experiential authority' (Fullagar, 2009, 404), suggesting credibility as a peer mentor and an online influencer (McCosker, 2018, 9–10).

With the focus on the first-person drug encounter, the findings of this study add to earlier qualitative research, suggesting that digital datasets – no matter how large they are – might not uncover entirely novel aspects of everyday medicinal encounters. By disassembling and reshuffling digital traces, the radar can, however, participate in presenting such encounters in a way that deepens earlier findings with additional detail. The unsolicited nature of digital datasets not only allows the exploration of sensitive aspects of drug use shared online, but it offers them collective weight. Medicine Radar pushes us to see collectively shared features of human-antidepressant experience more clearly. With its computational powers, the radar promotes a mode of

observation that begins by locating first-person accounts by tracing the drug and then allows the accounts to grow into a multi-first-person landscape – an *n of many ones* (Nafus, 2017). In terms of the multi-first-person landscape, comments that mention a particular drug are of key importance, because they contain intimate knowledge of the life effects of specific drugs, adding to the analysis of recurring responses to antidepressant agencies and pill-power. The multi-first-person landscape calls for seeing beyond the individual, giving form to the felt life effects of antidepressants and ultimately raising more general questions about medicinal agencies and how they should be dealt with collectively.

Following Bennett (2010), the focus on the agency of drugs pulls them into the domain of politics, proposing that political theory should concern itself with the material world. The first step in this direction requires that the powers and effects of medicinal agencies be collectively acknowledged. The online conversations testify to powerful nonhuman agencies that should not be engaged with lightly. In their articulation of life effects, the posts amplify negative and frustrating antidepressant experiences, but their emotional and exaggerated tone is no reason to downplay their overall message of the shakiness of the human-drug relationship. Articulations of antidepressant encounters stress the instabilities of medicinal agents and call for their evaluation in light of the relations they form with contemporary health care arrangements, forcefully challenging the normalization of antidepressants in terms of mental health care. The flaws, inconsistencies and disturbing life effects of antidepressants which have been the focus of this study are widely acknowledged both in research and in the online conversations. Tellingly, some of the writers wonder about the eagerness of doctors to prescribe antidepressants without considering their everyday consequences, as if it were completely normal and acceptable that the antidepressant user must endure the disturbing effects the drugs have on their lives. Significantly, there is no discussion of any difficulty in getting access to antidepressants; the drugs appear to be plentiful. As the posts point out, you just need to ask.

Sandell (2016, 145) notes that psychiatrists have lost control of antidepressants – they can be prescribed by any doctor, with no particular expertise in mental health, based on brief consultations, without treatment plans or follow-ups. A focus on collective responses to antidepressant effects can be seen as an ethical rather than a political stance, merely seeking to acknowledge the unruly nature of antidepressant agencies, while avoiding the responsibilization of the pharmaceutical industry, or the critical assessment of the politics and economics of health care arrangements (Lemke, 2018). To formulate a more robust political stance, a formal agenda is needed in order to question the social and economic factors that condition antidepressant use. The crucial first step is taken, however, when the pill powers of antidepressants and their life effects are collectively acknowledged.

4.2. Afterlife of the radar

The current version of Medicine Radar is a prototype with plans to update the Suomi24 dataset and improve the used vocabularies. Missing keywords can be reported online, so that they can be taken into account once the tool is revised. As a prototype that calls for further development, the social life of Medicine Radar is in its infancy, so far offering suggestions for reducing and sorting online health-related data in social scientific inquiry. With the open source resources that we offer, similar computational tools could be developed for organizing other kinds of digital datasets. Our approach is not language specific, although language specificities need to be taken into account. Further developments of the radar could involve functionalities that allow the visualization of the temporality of the posts. That way we could see when the drug talk has been most intense, but also when it dies down. More could also be done in terms of the analysis of comments. In this study, the empirical work relied on rounds of reading and sorting the material, but the analysis could be supported with additional technical features. In future versions of Medicine Radar, the medical concepts should not only be correlated with symptoms and dosages, but also with concepts related to the health care profession (doctor, diagnosis, prescription, care, hospital), in order to learn how prescriptions and doctors feature in the medication talk and whether health care professionals are as absent from antidepressant experiences as they appear in light of this study.

Isolating the drug from the body-mind is a technique that allows exploration of the agency of medications. Yet it should not be forgotten that medicines never act alone. Antidepressants are relational in their agencies and have effects both before they enter the body and after they leave it (Wilson, 2008; Bennett, 2010). The normalization of long-term antidepressant use has consequences for the depressed, but also for the nonhumans with whom we live: the mammals, fish and crustaceans in the oceans that are also being exposed to pill-power. Bennett (2015, 84) calls for transforming modes of consumption into their opposites; in the case of antidepressants one way forward would be to demand more mechanical causality from antidepressant agencies. With less trial and error in terms of antidepressant use, their overall consumption would not only decrease, but generate fewer undesired life effects.

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